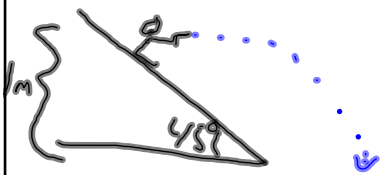
Physics Problem Solving Sheet

Problem 36 pg 110

Useful Description

Picture & Given Information:



y	x
$\Delta y = -1\,m$	$\Delta x = ?$
$v_{iy} = 1.41\,m/s$	$v_x = 11.1 + 1.41$
v_{fy}	
$a = -9.8\,m/s^2$	

$v_{x,boy} = 1.41\,m/s$

muzzle velocity $11.1\,m/s$

$v_{boy} = 2\,m/s$

$t = .329\,s$

$v_{iy} = v_{x,boy} = 2\,m/s \sin 45° = 1.41\,m/s$

$v_{x_{boy}} = 2\,m/s \cos 45° = 1.41\,m/s$

Question: How far will water go?

Target Quantiy: Δx

Physics Approach

Physics Concepts and/or Principles:

y: const. acc.

x: const vel.

Specific Application of Physics

Assumptions/ Constraints:

ignore air res.

Specific Equations:

$\Delta x = v_x t$

$\Delta x = \dfrac{v_i^2 \sin 2\theta}{9.8\,m/s^2}$

$\Delta x = \dfrac{v_x}{\sqrt{\frac{2\Delta y}{9.8\,m/s^2}}}$

Mathematical Procedures

Employ specific equations to solve for target quantity.

$\Delta x = \dfrac{v_x}{\sqrt{\frac{2(1m)}{9.8\,m/s^2}}}$

$\Delta x = v_x t$

$= (11.1\,m/s + 1.41\,m/s)(0.329\,s)$

$= 4.11\,m$

$v_x = \dfrac{\Delta x}{\sqrt{\frac{2\Delta y}{9.8\,m/s^2}}} = \dfrac{5\,m}{\sqrt{\frac{2(1m)}{9.8\,m/s^2}}} = 11.1\,m/s$

muzzle velocity

Check units & calculate